RMO-469

A Report on the Geology and Ore Deposits of the B'Cla B'Toh (Beclabito) District Carrizo Uplift Area, Arizona

September 10, 1944

In-75

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UNION MINES DEV. CORP.

NEW YORK, N.Y.

~~R-Moo-469~~

Lt. Col. P. L. Guarin
50 E. 42 St., NY

May 11, 1945

Mr. J. R. Van Fleet

Dear Col. Guarin:

Herewith are transmitted four copies of a preliminary report on the Beclabito District, Carrizo Uplift Area, prepared by the Grand Junction office, under the direction of Benj. N. Webber.

The best outcrops in the district are covered by claims owned by the Vanadium Corporation of America or by Curran Bros. and Wade. A detailed ore estimate for the district has not yet been made. However, Mr. A. H. Coleman, Chief of the party that performed the field work, considers the Syracuse Mine to have the best prospective value in the district. Inferred ore reserves of 1,150 tons of indicated 0.15% SO_3 and 2.0% V_2O_5 have been estimated for this property.

An attempt will be made by Union Mines Development Corporation to obtain the necessary additional information required to make a more detailed ore estimate for the district.

Very truly yours,

Robert H. Ridgway
mm

Union Mines Dev. Corp. Grand Junction, Colorado

August 14, 1944

Mr. Robert M. Ridgway
18th Floor - 50 E. 42nd Street
New York City

B'Cla B'Toh District
Carrizo Uplift Area

Dear Mr. Ridgway:

The attached maps and lists of ore occurrences were made by Party No. 1, A. M. Coleman party chief.

The information covers the B'Cla B'Toh District in the Carrizo Uplift Area in Arizona and New Mexico. The ore-bearing Salt Wash member in the B'Cla B'Toh District is a continuation of the ore-bearing member of the Morrison (Jurassic) occurring on the west side of the Carrizo Uplift, most of which is now held by Union Mines Development Corporation under lease from the Indian Service. The outcrops can not be traced completely around the north end of the uplift as they are partly buried by younger Pecapture shale and Westwater formation. Many of the occurrences in the B'Cla B'Toh District seem to have presented an outcrop appearance analogous to those on the west side of the uplift, now held by Union Mines Development Corp.

The B'Cla B'Toh District is reputed to have produced about 12,000 tons of ore, which was mostly shipped to the Durango plant, D.P.C.-owned and U.S.V.-operated. All of the mining districts around the periphery of the Carrizo Uplift have been held back by economic conditions, mostly transportation distance from existing plants. It is only since the Metals Reserve purchasing and access road program that appreciable production in this area has been feasible.

As may be ascertained from the areal maps attached, the most favorable portion of this district is held by the Vanadium Corporation of America under leases from the Navajo Indian Service.

Ore occurrences other than these held by V.C.A. are rather thin and low-grade; however, many of these are analogous to some held by U.M.D.C. on the west side of the uplift.

A brief inspection of the largest V.C.A. workings by the writer suggests that this district would produce a tonnage at least equal to past production, should economic conditions again justify an operation. The fact that V.C.A. shut down their B'Cla B'Toh operations on the termination of the Metals Reserve purchasing program would seem to indicate that Carrizo ore is sub-marginal under present conditions.

V.C.A.'s leaseholds have been put in on our map by approximate reconnaissance methods. In order to determine what ground remains open it would be necessary to obtain the V.C.A. lease records from the Indian Service and make a transit survey from the indicated U.S. Mineral Land Monument after determining an astronomical meridian. This would probably result in determining that much of V.C.A.'s production came from outside the confines of their leases.

It is doubtful if a sufficient number of occurrences remain off of V.C.A.'s lease to justify our negociating with the Navajo Indian Service for them and incurring V.C.A.'s enmity.

Respectfully submitted,

(sgd.)

Benj. M. Webber, Senior Geologist
Union Mines Development Corp.
Grand Junction Field Office

BMW/dab

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A REPORT ON THE GEOLOGY AND ORE DEPOSITS

of the

B'CLA B'TOH (BECLABITO) DISTRICT
CARRIZO UPLIFT AREA, ARIZONA

September 10, 1944

by
A. H. COLEMAN

UNION MINES DEVELOPMENT CORPORATION

GRAND JUNCTION FIELD OFFICE

GRAND JUNCTION, COLORADO

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B'CLA B'TOH (BECLABITO) DISTRICT, CARRIZO UPLIFT AREA

INTRODUCTION

Location:

The area covers an approximate length of 22 miles between Red Rock, Arizona and Beclabito, Arizona. The axis of the area is north-south. The district can be reached by 22 miles of dirt road from Shiprock, New Mexico to Beclabito, Arizona or by 6 miles of oiled road and 21 miles of dirt road from Shiprock New Mexico to Red Rock, Arizona.

Topography and Drainage:

The area is located on the plain and foothill portion of the east flank of the Carrizo Mountains. The surface is badly cut up by arroyos and canyons. The drainage is generally eastward into the Red Wash, which in turn drains into the San Juan River, northwest of Shiprock, New Mexico.

Water Supply:

There are no permanent streams in the area. However, there are numerous springs, generally along the contact of the Entrada and lower Morrison formations. These springs vary in flow up to a maximum of 10 gallons per minute. Most of the springs have been developed by the Indian Agency, by means of water boxes, to provide stock water.

Timber:

Timbers for mine support are generally brought in from the Lukachukai Mountains, 8 miles south of Red Rock, Arizona. Here pine and aspen is available for mine props.

Accessibility:

Despite the roughness of the terrain, numerous Navajo wagon roads and trails, as well as truck roads built by Vanadium Corporation of America and Curran Bros. & Wade, for access to their properties, render all parts of the area fairly accessible except in winter time when mud conditions make travel exceedingly difficult for car or truck.

GENERAL GEOLOGY

East and southeast of the Carrizo Mountains, the sedimentary beds show a generally constant north-south strike and an eastward dip of 2-2½ degrees. Near the base of the Carrizo Mountains, the beds have been tilted by the effect of the Carrizo intrusion. The strike in this uplifted area roughly circles the base of the intrusion; the dip is still eastward, with a maximum of 15 degrees.

In the northeast portion of the area, the sediments have been domed, apparently by a deep-seated phase of the Carrizo intrusion, to form the Beclabito Dome. This structure has one test well drilled on it, reported to be 1700 feet in depth.

No oil production was developed but the well makes an appreciable flow of natural gas.

Numerous basic dikes and intrusive plugs were noted in the area. Several of the more prominent intrusive plugs occur in the best area of vanadiferous mineralization, but appear to have no connection with the mineralization.

The sedimentary beds mapped in the area, consisted of the Carmel, Entrada, lower Morrison (Salt Wash), upper Morrison (westwater member and Brushy Basin member) and Dakota.

The following is a brief description of these formations:

Carmel:

This formation varies in thickness from 61 to 138 feet. It consists of a hard, fine-grained, reddish-brown sandstone, interbedded with softer gray sandstone strata, 1 to 3 feet in thickness. The formation forms a cliff and has a banded appearance, due to the gray beds. The formation is limy throughout. The sand grains are fine and fairly well rounded. The formation weathers in vertical flutes and this, combined with the weathering of the horizontal, less resistanct gray beds, gives it a peculiar and characteristic blocky or "pillow-like" appearance. The formation is remarkably even-bedded. Very little minor cross-bedding was noted. The contact with the Entrada formation showed an erosional or gradational unconformity. No angular unconformity was noted.

Entrada:

The Entrada formation varies from 9 to 36 feet in thickness. It is a reddish-brown to buff sandstone and mudstone, interbedded with thin beds of gray sandstone. The sand grains are subangular and fine to medium grained. The buff sandstone is very limy. The gray sandstone carries very little lime. A 6-inch bed of gray sandstone forms the top of the formation. Marked cross-bedding was noted throughout. The contact with the Salt Wash is erosional. No angular unconformity was noted.

Lower Morrison (Salt Wash):

Where the complete Salt Wash section was exposed, it was found to vary from 212 to 285 feet in thickness. For a detail description of the Salt Wash, consult the geologic columns accompanying the maps of the area.

Upper Morrison (Westwater member):

The thickness of this formation varies from 225 to 526 feet. This formation is predominantly a massive, fine to medium grained sandstone, grayish-white, yellowish-buff and Greenish-yellow in color. It is interbedded with minor amounts of reddish-brown and greenish-gray shales. It can readily be separated from the Salt Wash in that it weathers out into blocks whereas

the Salt wash weathers into slabs. From a distance, the formation has a pale-green to yellowish-green color.

Upper Morrison (Brushy Basin member):

Where the complete section was exposed, the thickness varied from 229 to 258 feet. The formation consists of a nondescript mixture of yellowish-green and gray, fine grained sandstone, interbedded with light pink, reddish-brown, gray and white shales and siltstones. Considerable amounts of brick-red and dark-green cherts are interbedded with the shales. The sandstone shows local minor cross-bedding.

Dakota:

A maximum of 21 feet of the lower Dakota is exposed as a residual capping to two localities in the area. The lower 10 feet consists of alternate beds of coarse grained, pale-buff to gray sandstone and trashy conglomerate beds of well-rounded quartz pebbles up to 2½ inches in diameter. The trash consists of abundant fragments of angular silicified wood. Few rounded or subangular fragments were noted. The upper 11 feet is of massive, light-buff, medium -grained, well-cemented sandstone, strongly cross-bedded.

ORE DEPOSITS

A total of 128 ore outcrops were noted and located in the area. A brief description of these outcrops follows:

S-B 2

From Station 16, S. 8½°E., 5900 ft.
Outcrop is 18 ft. long, consisting of two ore zones totaling 1.35 in thickness and about 2 ft. apart.
Office sample No. 1278: 1.35'-0.03-1.47(T);0.975(E).

S-B 3

From Station 16, S.3¼°E., 7320 ft.
Outcrop is discontinuous over 225 ft., and has been followed into the hill for 75 ft. Average thickness is about 4 ft.
No sample taken. Intended to be on VCA ground.

S-B 4

From Plug 1, N.27½°W., 3375 ft.
A zone of vanadiferous float about 100 ft. long.
No sample taken. Grade estimated to be 2% V_2O_5.

S-B 5

From Plug 1, N.64½°W., 2125 ft.
Outcrop is 15 ft. long, average thickness 3 ft.
No sample taken. Grade estimated to be 2% V_2O_5.
Slight carnotite showing. Located on VCA ground.

S-B 6

From Plug 1, N.62°W., 1580 ft.
Outcrop is 50 ft. long, consisting of two seams, each 0.2 to 0.4 ft. thick.
No sample taken. Grade estimated to be 2% V_2O_5.
Located on VCA ground.

S-B 7

From Plug 2, N.62°E., 4250 ft.
325 ft. of outcropping ore occurring discontinuously over a distance of 600 ft.
Thickness averages 0.5 ft.
No sample taken. Grade estimated to be 2% V_2O_5.
Located on VCA ground.

S-B 8

From Plug 2, N.11½°E., 4980 ft.
Outcrop is 100 ft. long; thickness averages 0.25 ft.
No sample taken. Grade estimated to be 1% V_2O_5.
Located on VCA ground.

S-B 9

From Plug 2, N.6°E., 4280 ft.
Outcrop is discontinuous over an area 600 ft. by 800 ft.
Thickness varies from 0.2 to 2.0 ft. No sample taken.
Grade may average 2½% V_2O_5. Located on VCA ground.

S-B 10

From Plug 2, N.1°E., 2650 ft.
Outcrop is 100 ft. long, averaging 0.2 ft. in thickness.
No sample taken. Located on VCA ground.

S-B 11

From Plug 1, S.36½°W., 1775 ft.
Outcrop is discontinuous over an area 400 ft. by 500 ft.
Thickness indefinite. No sample taken.
Located on VCA ground.

S-B 12

From Plug 1, N.45°W., 4750 ft.
Outcrop is discontinuous over 225 ft. Thickness indefinite.
No sample taken.
Located on VCA ground.

S-B 13

From Station A, S. 40°W., 2000 ft.
25 ft. of outcropping ore occurring over total length of 50 ft. Average thickness 0.25 ft.
No sample taken. Estimated grade 2% V_2O_5.
Located on VCA ground.

S-B 14
From Station 5, N.13°W., 3400 ft.
Outcrop is 10 ft. long; average thickness 1 ft.
No sample taken. Estimated grade 1% V_2O_5.
Located on VCA ground.

S-B 15
From Station 5, N.21½°W., 3900 ft.
Outcrop is 12 ft. long, occurring discontinuously over distance of 50 ft.
Average thickness is 0.5 ft.
No sample taken. Estimated grade 2% V_2O_5.
Located on VCA ground.

S-B 16
From Station 5, N.21°W., 3800 ft.
Outcrop is 15 ft. long, averaging 1.0 ft. thick.
No sample taken. Estimated grade 2% V_2O_5. Trace of carnotite showing.
Located on VCA ground.

S-B 17
From Station 5, N.19°W., 3400 ft.
Outcrop is 4 ft. long; thickness in excess of 1½ ft.
No sample taken. Estimated grade 2% V_2O_5.
Intended to be on VCA ground.

S-B 18
From Station 5, N.14°W., 3300 ft.
Discontinuous over 20 ft.; average thickness 0.15 ft.
No sample taken. Estimated grade 1% V_2O_5.

S-B 19
From Station 38, S.11°W., 6100 ft.
Outcrop is 8 ft. long, vertical range of 4 ft. Ore is displaced from cliff, and does not show on face of cliff.
Office Sample No. 1263: Grab-0.03-1.23(T);0.03(E).

S-B 20
From Station 32, S.50½°W. 4250 ft.
Outcrop is discontinuous for length of 50 ft.; average thickness 0.65 ft.
Office sample No. 1264: 0.65'-0.05-1.54(T);0.06(E).

S-B 21
From Station 32, S.25½°E., 5460 ft.
Outcrop is 25 ft. long, averaging 0.85 ft. thick.
Office Sample No. 1266: 0.85'-0.17-1.73(T);0.20(E).

S-B 22
From Station 32, S.29°W., 4600 ft.

17 ft. of outcrop occurring discontinuously over 40 ft., averaging 0.3 ft. thick.
Office Sample No. 1265: 0.45' - 0.19 - 3.63(T); 0.20(E).

S-B 30

From Station 27, N.63°E., 5400 ft.
150 ft. of ore outcropping discontinuously over 220 ft., averaging 2 ft. thick.
Office Sample No. 1385 taken on W. end of outcrop:
0.8' -0.12-3.49(T); 0.14(E).

S-R 31

From Station 27, N.7½°E., 5700 ft.
Zone of vanadiferous float about 40 ft. long.
Not sampled. Average estimated grade 1½% V_2O_5.

S-B 32

From S-B 30, N. 89°W., 2600 ft. On south wall of canyon.
Zone of good grade vanadiferous float about 40 ft. long.
Not sampled.

S-B 33

From S-B 30, N.65°W., 2050 ft.
Outcrop is 10 ft. long, 0.3 ft. to 0.6 ft. in thickness.
Office Sample No. 1390: 0.6'-0.18-2.57 (T);0.17(E).

S-C 1

From Station 25, S. 16°W., 850 ft.
Outcrop can be traced discontinuously for about 200 ft., 0.1 to 0.5 ft. thick where exposed.
Office Sample No. 1267: 0.4'-0.42-1.49(T); o.225(E).

S-C 2

See west adit, north side of Syracuse mine, on 1" = 50' detail map of Syracuse mine.

S-C 3

See east adit, north side of Syracuse mine, on 1" = 50' detail map of Syracuse mine.

S-C 4

See south side workings of Syracuse mine, on 1" - 50' detail map of Syracuse mine.

S-C 5

From Station 2, N.31½°W., 7600 ft.
Main part of outcrop 20 ft. long; outcrop can be traced about 75 ft. 0.8 to 1.5 ft. in thickness.
Office sample No 1262: 0.8'-0.05-0.62(T);0.04(E).

S-C 6

From Station 32, S.3-3/4°E., 4300 ft.
Poorly exposed showing can be traced discontinuously for about 50 ft.; 0.25 to 0.5 ft. in thickness
Office Sample No. 1269: o.3'-0.05-1.33(T);0.045(E).

S-C 7

From Station 23, S.60°E., 700 ft.
Exposed for 25 to 30 ft. in length, 0.5 to 1.0 ft. in thickness.
Office Sample No. 1261: 0.8'-0.04-0.62(T);0.09(E).

S-E 2

From Station 22, S.29½°W., 1300 ft.
35 ft. of outcrop discontinuous over total length of 78 ft,m 0.6 to 2.5 ft. in thickness.
Office sample No. 1277: 2.5'-0.06-0.90(T);0.075(E).

S-E 3

From Station 22, S.21°W., 100 ft.
Outcrop exposed for 3 ft., average thickness 0.5 ft.
Office Sample No. 1274: 0.7'-0.03-0.81(T);0.06(E).

S-E 5

From Station A, S.11½°W., 2250 ft.
Outcrop has been worked for 30 ft. length. Exposed on face 4 ft. long, averages 0.4 ft. in thickness. Estimated grade 2-3/4% V_2O_5. Not sampled.
Located on VCA ground.

S-E 6

From Station A. S.16½°W., 2100 ft.
Some ore has been removed. Exposure on face 10 ft. long, averaging 0.4 ft. thick, estimated grade 1/2% V_2O_5.
Not sampled.
Located on VCA ground.

S-E 7

From Station A. S.22°W., 2100 ft.
Ore has been removed over 40 by 75 ft. area. Main exposure on NE. face exposed for 6 ft., 0.5 to 1.0 ft. in thickness, estimated grade 2½% V_2O_5 1.5 ft. above it, 25 ft. outcrop, averaging 0.15 ft. thick. estimated grade 2½% V_2O_5. Main exposure on SW. face 12 ft. long, averaging 0.5 ft. thick, istimated grade 2% V_2O_5. Not sampled.
Located on VCA ground.

S-E 8

From Station A, S.28½°W., 2050 ft.
A 50 ft. drift; at portal ore has average thickness of ft., estimated 2% V_2O_5. 50 ft. up-dip from protal, showing on open-cut face 12 ft. long, averaging 0.4 ft. in thickness, estimated grade 1½% V_2O_5. Not sampled.
Located on VCA ground.

S-E 9

From Station 6, N.62°E., 4400 ft.
On east side of gully, 35 ft. of outcrop discontinuous over 145 ft., 0.1 to 2.0 ft. in thickness, estimated grade 2% V_2O_5. On west side of gully, 10 ft. in thickness, estimated average grade 1-3/4% V_2O_5. Not sampled
Located on VCA ground.

S-E 10

From Station 6, N.66°E., 4500 ft.
Series of very thin and discontinuous surface and float showings for 500 ft. around nose of ridge. Estimated grade 2 to 3% V_2O_5. Not sampled.
Located on VCA ground.

S-E 11

From Station 6, N.51°E., 3950 ft.
Very thing float showing. Estimated grade 2% V_2O_5. Not sampled.
Located on VCA ground.

S-E 12

From Station 6, N.61°E., 4300 ft.
Outcrop exposed for 10 ft.; average thickness 0.2 ft.,
Located on VCA ground.

S-E 13

From Station 6, N.63°E., 4300 ft.
Discontinuous, very poorly exposed outcrop over length of 50 ft. 0.1 to 1.0 ft. in thickness. Not sampled.
Located on VCA ground.

S-E 14

From Station 6, N.73½°E., 4700 ft.
Two outcropping seams, separated from 5 to 8 feet. Lower seam 240 ft. long, averaging 0.4 ft. in thickness. Estimated grade 2% V_2O_5. Upper seam 50 ft. long, 0.5 to 2.5 ft. thick, with fair carnotite showing, estimated grade 2% V_2O_5. Not sampled.
Located on VCA ground.

S-E 15

From Station 6, N.69°E., 4650 ft.
Small local zone of vanadiferous float, similar to S-E 10. Not sampled.
Located on VCA ground.

S-E 16

From Station 6, N.69½°E., 4800 ft.

Outcrop poorly exposed, length probably not exceeding 5 ft., maximum thickness 0.3 ft. Not sampled. Estimated grade 2% V_2O_5.
Located on VCA ground.

S-E 17

From Station 16, N.88°W., 6200 ft.
Outcrop has been worked over 18 ft. by 40 ft. area. On face outcrop is 50 ft. long, 0.2 to 1.5 ft. thick. Not sampled. Estimated average grade 2½% V_2O_5. Seam 1½ ft. above west end of above seam is 12 ft. long, averaging 0.5 ft. thick, estimated grade 2% V_2O_5. Not sampled.
10 ft. long, 0.25 ft. thick showing 55 ft. from west end.
Located on VCA ground.

S-E 18

From Plug 1, N.36½°E., 1650 ft.
Outcrop is 14 ft. long, 0.2 to 1.0 ft. thick.
Office Sample No. 1397: 0.45'-0.03-0.75(T); 0.03(E).

S-E 19

From Plug 1, N.12°W., 3600 ft.
Outcrop poorly exposed in part, but apparently continuous over 85 ft. Average thickness 0.5 ft. Not sampled.
Located on VCA ground.

S-E 20

From Station 16, N.84½°W., 5800 ft.
25 ft. zone of vanadiferous float. Not sampled.
Located on VCA ground.

S-E 21

From Station 16, N.86°W., 5950 ft.
25 ft. zone of vanadiferous float. Ore exposed for 3 ft. average thickness 0.5 ft. Not sampled. Estimated grade 2-3/4% V_2O_5.
Located on VCA ground.

S-E 22

From Station 16, S.89°W., 5700 ft.
Outcrop has been worked. Face shows a lower seam, 20 ft. long, average thickness 0.5 ft., estimated grade 3% V_2O_5.
9 ft. above it upper seam 40 ft. long. 0.7 to 1.0 ft.thick, estimated grade 2% V_2O_5. Not sampled.
Located on VCA ground.

S-E 23

From Station 16, N.88½°W., 5800 ft.
Poorly exposed 25 ft. showing, thickness not exceeding 0.25 ft. Fair carnotite showing. Not sampled.
Located on VCA ground.

S-E 24
From Station 6, N.73°E., 5600 ft.
Outcrop shows 30 ft. of ore over 37 ft. in length, average thickness 0.5 ft., estimated grade 2% V_2O_5.
Not sampled.
Located on VCA ground.

S-E 25
From Station 16, N.87½°W., 5800 ft.
Zone of estimated 2% vanadiferous float 70 ft. long, continuous for 35 ft. Not sampled.
Located on VCA ground.

S-E 26
From Plug 1, N.55½°E., 2700 ft.
60 ft. of ore showing in zone 85 ft. long. Thickness of main 50 ft. showing averages 2 ft.
Office Sample No. 1399: 2.2'-0.04-1.54(T);0.11(E).

S-E 27
From Plug 1, N.66½°E., 3400 ft.
Outcrop is 21 ft. long, 0.8 to 2.5 ft. thick.
Office Sample No. 1394: 0.8'-0.03-0.35(T);0.08(E).

S-E 28
From Plug 1, N.65°E., 3350 ft.
Outcrop is 34 ft long, 0.25 to 1.3 ft. thick.
Office Sample No. 1379: 0.25'-0.03-2.06(T);0.07(E).

S-E 29
From Station B, N.71°E., 2450 ft.
110 ft. of outcrop over 200 ft. distance. Thickness averages 0.25 ft. except as below:
S-E 29 (a) is 40 ft. long, 0.2 to 2.5 ft. thick.
Office Sample No. 1371: 1.1'-0.09-1.59(T);0.15(E)
S-E 29 (f) is poorly exposed for 20 ft., 0.6 to 4 ft. thick.
Office Sample No. 1392: 1.0'-0.07-1.68(T);0.135(E).

S-E 30
From Station A, N.24°W., 4159 ft.
90 ft. of outcrop over 150 ft. distance, maximum thickness 0.1 ft. Estimated grade 2% V_2O_5.
Not sampled.

S-E 31
From Station A, N.32½°W 4550 ft.
Outcrop is 20 ft. in length, 1 to 4 ft. in thickness.
Office Sample No. 1376: 2.3'-0.23-4.53(T);0.20(E).

S-E 32
From Station A, N.43°W., 4600 ft.
S-E 32 (a), is 20 ft. long, 0.4 to 1.4 ft. thick.
Office Sample No. 1381: 1.4'-0.21-3,25(T);0.23(E).

S-E 32 (b) is 50 ft. from S-E 32 (a), 5 ft, in length, 0.4 to 1.3 ft. thick.
Office Sample No. 1383: 1.3'-0.06-1.37(T);0.10(E).

S-E 33

From Station A, N.28½°W., 4400 ft.
Outcrop is 12 ft. long, 0.5 to 1.5 ft. in thickness.
Office Sample No. 1372: 1.5'-0.04-1.16(T);0.20 (E).

S-E 34

From Station A, N. 18°W., 4450 ft.
A 200 ft. poorly exposed glauconitic zone that is locally vanadiferous. Thickness averages 0.1 ft. A unique occurrence, 105 ft. above principal ore horizon.
Not sampled.

S-E 35

From Station A, N.39°W., 4600 ft.
A negligible occurrence of vanadiferous float .
Not sampled.

S-E 36

From Station 31, N.39°W., 5000 ft.
A very local occurrence of estimated 2½% V_2O_5 vanadiferous float.
Not sampled.

S-E 37

From Plug 2, S.20°E., 2050 ft.
36 ft. of ore exposed within 55 ft. distance. 0.5 to 4.3 ft. in thickness.
Office Sample No. 1279: 4.3'-0.03-1.05(T);0.05(E).

S-E 38

From Plug 2, S.23½°E., 2050 ft.
Outcrop is 25 ft. long, 0.5 ft. in average thickness.
Office Sample No. 1275: 0.5'-0.03-0.47(T); fo pulp left for (E).

S-E 39

From Plug 2, S.39°E., 2150 ft.
Very local occurrence of vanadiferous float.
Not sampled.

S-E 40

From Plug 2, S.50°E., 2600 ft.
Outcrop is exposed for 8 ft., and is 0.2 ft.in average thickness.
Office Sample No. 1270: 0.3'0.05-1.18(T);0.15(E).

S-E 41

From Plug 1, 8.54°E., 2750 ft.
Outcrop is 32 ft. in length, 0.3 to 1,5 ft. in thickness.
Office Sample No. 1276: 1.5'-0.16-2.98(T);0.175(E).

S-E 42
From Station 32, S.66°E., 200 ft.
The possible vanadiferous portion of the outcrop is 4 ft. long, averages 0.3 ft. in thickness.
Office Sample No. 1384: 0.9'-0.09'0.16(T);0.06(E).

S-E 43
From Station 18, N.87°W., 11750 ft.
Outcrop is discontinuous over about 30 ft.; best portion is 6 ft. long and 0.4 to 2.0 ft. in thickness.
Not sampled.

S-W 1
From Station 22, N.46°E., 6800 ft.
Outcrop is 6 ft. long 0.17 to 0.5 ft in thickness.
Estimated grade is 0.5% V_2O_5, trace of SOQ.
Not sampled.

S-W 2
From Station 22, N.48°E., 6950 ft.
Outcrop is 159 ft. long, 0.2 to 0.8 ft. in thickness.
Office Sample No. 1268: 0.75'-0.04-0.24(T);0.065 (E).

S-W 3
From Station 16, S.22 1/4°E., 8150 ft.
Outcrop is 50 ft. in length, 0.4 to 1.5 ft in thickness.
Office Sample No. 1273: 0.4'-0.28-0.05(T);0.265(E).

S-W 4
From Station 16, S.23½°E., 8500 ft.
Outcrop is 21 ft. in length, 0.4 to 1.5 ft. in thickness.
Office Sample No. 1271: 0.4'- o.24-0.24(T);0.78(E).

S-W 5
From Station 22, N.69½°E., 6000 ft.
Thin coating of carnotite covering a sandstone surface of 4 square feet. No vanadiferous sandstone noted.
Not sampled.

S-W 6
From Station 16, S.37½°W., 4900 ft.
Shallow open-pit working, 103 ft. long, 0.1 to 0.7 fy. in thickness. Not sampled. Estimated grade 2½% V_2O_5 0.1 to 0.2% SOQ.
Located on VCA ground.

S-W 7
From Plug 1, S.56°E., 1250 ft.
Shallow open-pit working, 50 ft. by 21 ft. in area.
Ore on pit surface is 0 to 0.5 ft. in thickness. Seam on face is 12 ft. long, 0.5 to 1.0 in thickness.

Not sampled. Estimated grade is 1/2% V_2O_5 to 1½% V_2O_5, 0.05 to 0.1 SOQ.
Located on VCA ground.

S-W 8

From Plug S.9 3/4°E., 1450 ft.
Outcrop is 48 ft. in length, 6 to 9 ft. in thickness, the surface showing of a VCA mine. At north end a 7 ft. stretch concains high-gradw vanadiferous sandstone with much hewettite, metahwettite, and carnotite, estimated grade 4% or higher V_2O_5, 0.5 to 1.0 SOQ. Running through the main ore body is a vanadiferous seam 0.5 to 0.7 ft. thick, estimated 1.5 to 3.0% V_2O_5, 0.2 to 0.3 SOQ. Remainder of showing is estimated to run less than 1% V_2O_5, 0.1 SOQ. Not sampled.
Located on VCA ground.
From S-W 8, 75 ft. N.60°E., 25 ft. showing, 0.17 to 0.3 ft. thick, which has been worked. Not sampled.
Estimated grade 3½% V_2O_5, o.2 SOQ.
Located on VCA ground.

S-W 9

From Station A, N.75°E., 275 ft.
Small patches of secondary carnotite on sandstone surfaces. No vanadiferous sandstone noted. Not sampled.

S-W 10

From Station 10, S.10½°W., 920 ft.
Outcrop is 5 ft. in length, 0.17 to 0.75 ft. in thickness
Not sampled. Estimated grade is 0.5 to 3.0% V_2O_5, 0.15 SOQ.
Located on Syracuse ground.

S-W 11

From Station 10, S.29½°W., 900 ft.
Outcrop is 8 ft. long, 0.37 to 0.5 ft. in thickness.
Office Sample No. 1391: -.37'-0.04-2.79(T); 0.08(E).

S-W 12

From Station 10, S.39½°W., 900 ft.
Outcrop is 29 ft. long, 0.5 to 0.75 ft. in thickness.
Office Sample No. 1380: 0.5'-0.03-1.73(T);0.08(E).

S-W 13

From Station 10, S.47½°W., 960 ft.
Outcrop poorly exposed for 3 ft., 0.6 to 1.08 in thickness.
Office Sample No. 1375: 1.08'-0.16-3.15(T);0.20(E).

S-W 14

From Station 10, S.23°E., 820 ft.
Outcrop is 15 ft. long, 1 to 1.3 ft. in thickness.
Not sampled. Estimated grade is 1% V_2O_5, 0.09 SOQ.
Located on Syracuse ground.

S-W 15

From Station 10, S.37°E., 840 ft.
Outcrop is 3 ft. long, 0.5 ft. in thickness.
Not sampled. Estimated grade is 3% V_2O_5, 0.2 SOQ.
Located on Syracuse ground.

S-W 16

From Station 10, S.53½°E., 1080 ft.
Outcrop is 3 ft. long, 0.17 to 0.4 ft. in thickness.
Not sampled. Estimated grade is 2% V_2O_5, 0.1 SOQ.
Questionable whether located on Syracuse, VCA, or open ground.

S-W 17

From Station 10, S.63½°E., 1120 ft.
Ore is discoutinuous over 105 ft.
S-W 17 (a). Outcrop is 12 ft. long, average thickness 0.5 ft.
S-W 17 (b). is 35 ft. long, 0.1 to 0.2 ft. in thickness
S-W 17 (c). is 8 ft. long, 0.5 in average thickness.
Estimated grade of (a), 2½% V_2O_5, 0.15 SOQ; (b), 2½% V_2O_5, 0.1 SOQ; (c), 1½% V_2O_5, 0.1 SOQ. Not sampled.
Located on VCA ground.
From S-W 17, S.65°E., 150 ft., negligible and poorly exposed vanadiferous outcrop.

S-W 18

From Station 1, N.85 3/4°W., 4300 ft.
Outcrop is 33 ft. long, 0.5 to 3.0 ft. in thickness.
Not sampled. Estimated grade averages 0.4 to 0.75% V_2O_5 for 26 ft. with trace of SOQ, 2.5% V_2O_5, 0.2 SOQ for 7 ft.
Located on VCA ground.

S-W 19

From Station 18, S.23°E., 8780 ft.
Outcrop is 20 ft. long, 0.5 to 1.7 ft. in thickness.
Was sampled. Estimated grade is 1.5% V_2O_5, 0.15 SOQ.
Office Sample No. 1396: 0.75'-0.03-1.42(T);0.04(E).

S-W 20

From Station 2, N.70°W., 3940 ft.
Outcrop is 12 ft. long, 0.5 to 0.8 in thickness.
Not sampled. Estimated grade is 2% V_2O_5, 0.15 SOQ.
Located on VCA ground.

S-W 21

From Station 2, N.70°W., 4120 ft.
Outcrop is 62 ft. long, 0.3 to 1.0 ft. in thickness.
Not sampled. Estimated grade is 1½% V_2O_5, 0.15 SOQ.
Located on VCA ground.

S-W 22

From Station 2, N.71½°W., 4100 ft.
Outcrop is on a narrow point.

On NE side, length of 19 ft., thickness is 0.5 to 0.7 ft. Estimated grade is 0.75% V_2O_5, trace of SOQ.
1.0 ft. in thickness. Estimated grade is 1 to 2% V_2O_5, 0.1 SOQ. Not sampled.
Located on VCA ground.

S-W 23

From Station 1, due W., 4440 ft.
Outcrop is 28 ft. long, 0.5 to 2.5 ft. in thickness. Continuous seam averaging 1 ft. in thickness has estimated grade of 1 3/4% V_2O_5 to 2½% V_2O_5, 0.15 SOQ. Remainder of mineralized zone, 18 ft. long discontinuous over entire length, estimated to run less than 1% V_2O_5. Not sampled.
Located on VCA ground.

S-W 24

From Station 1, N.85°W., 4140 ft.
Outcrop is 9 ft. long, 0.5 to 0.7 ft. in thickness. Not sampled. Estimated grade is 0.7% V_2O_5, 0.05 SOQ.
Located on VCA ground.

S-W 25

From Station 10, S.69°E., 940 ft.
Outcrop is 10 ft. long, 0.17 to 0.4 ft. in thickness. Not Sampled. Estimated grade is 1½% V_2O_5, 0.1 SOQ.
Located on VCA ground.

S-W 26

From Station 10, N.79°E., 880 ft.
Outcrop is 57 ft. in length, 0.5 to 1.0 ft. in thickness for 44 ft.; 0.1 to 0.2 ft. for 13 ft. Not sampled.
Located on VCA or Syracuse ground.

S-W 27

From Station 3, S.26°W., 9720 ft.
Outcrop is 48 ft. long, 1 to 3 ft. in thickness.
Office Sample No. 1393: 2.5'-0.32-3.55(T);0.38(E).
(May be located on VCA ground, but does not plot that way).

S-W 28

From Station 10, N.67°E., 2560 ft.
Outcrop is part of surface showing of VCA's North Star mine, at tunnel portal. Showing on SW. side of portal is 20 ft. in length, 0.1 to 0.2 ft. in thickness. Estimated grade is 2½% V_2O_5, 0.15 SOQ.
Showing on NE. side of portal is 22 ft. in length, 1 ft. in average thickness. Estimated grade is 3% V_2O_5, 0.15 SOQ.
No samples taken .
Located on VCA ground.

S-W 29

From Station 10, N.67½°E., 2620 ft.
Outcrop is at a portal of the NorthStar mine. Showing on NE. side of portal is 23 ft. long, of which 16 ft. is 0.1 ft. thick or less, running less than 1% V_2O_5 with a trace of SOQ (estimated); remaining 7 ft. length has thickness of 0.33 ft.m estimated grade of 1% V_2O_5, trace of SOQ. No showing on SW. side. No samples taken. Located on VCA ground.

S-W 30

From Station 10, N.67°E., 2700 ft.
Consists of surface outcrops at portals of two small stopes. Between the two stopes there are two seams about 1 ft. apart Lower seam, 2 ft. long, is 0.5 ft. in thickness; estimated grade 2½% V_2O_5, 0.2 SOQ. Upper seam is 4 ft. long, 0.2 to 0.3 ft. in thickness; estimated grade is 3½% V_2O_5, 0.25 SOQ. On NE. side of E, stope, outcrop is 9 ft. long, 1 to 2 ft. in thickness estimated grade is 1½% V_2O_5, 0.15 SOQ. Northeasterly from the above showing, 18 and 28 ft. respectively, are two small vanadiferous seams; the first is 4 ft. in length, 0.5 to 1.0 ft. in thickness, estimated grade 1½% V_2O_5, 0.1 SOQ; the latter is 5 ft. long, 0.1 to 0.2 thick, estimated grade 3% V_2O_5, 0.15 SOQ. No samples taken.
Located on VCA ground. Part of North Star mine workings.

S-W 31

From Station 10, N.67½°E., 3300 ft.
Outcrop is 40 ft. in length, 0.17 to 0.33 ft. in thickness. Not sampled. Estimated grade is 2½% V_2O_5, 0.2 SOQ.
Located on VCA ground.

S-W 32

From Station 2, N.82°W., 4100 ft.
Outcrop is 43 ft. long, 0.1 to 0.2 ft. in thickness. Not sampled. Estimated grade is 2½% V_2O_5, 0.15 SOQ.
Located on open ground.

S-W 33

From Station 18, S.71°E., 3220 ft.
Outcrop is 21 ft. in length, 0.3 to 0.5 in thickness.
Office Sample No. 1373: 0.8'-0.05-2.18(T);0.13(E).

S-W 34

From Station 18, S.70°E., 3100 ft.
Outcrop is 5 ft. long, average thickness is 0.25 ft. Not sampled. Estimated grade is 3.4% V_2O_5, 0.05 SOQ.

S-W 35

From Station 18, S.76°E., 2720 ft.
Outcrop is 65 ft. long, but thickness uncertain because of debris, probably not over 0.3 ft. Not sampled. Estimated grade 1% V_2O_5, 0.1 SOQ.

S-W 36
From Station 18, S.58½°E., 2120 ft.
30 ft. zone of vanadiferous float, 15 ft. seam 0.1 to 0.5 ft. in thickness, making 45 ft. in all. Not sampled.
Estimated grade is 0.5% V_2O_5, trace SOQ.

S-W 37
From Station 18, N.76°E., 1800 ft.
Outcrop is 12 ft. in length, 0.1 to 0.25 ft. in thickness.
Not sampled. Estimated grade 0.5% V_2O_5, trace SOQ.

S-W 38
From Station 18, N.73°E., 1700 ft.
Outcrop is 25 ft. long, 0.25 to 0.5 ft. in thickness.
Office Sample No. 1374: 0.5'-0.12-4.22(T);0.23(E).

S-W 39
From Station 3, N.81°W., 5040 ft.
Outcrop is 15 ft. in length, 0.1 to 0.25 ft. in thickness.
Not sampled. Estimated grade 1/2% V_2O_5, trace of SOQ.

S-W 40
From Station 18, S.26°E., 550 ft.
Outcrop is 36 ft. long, consisting of two seams a foot apart. Lower seam for 21 ft. is 0.5 to 0.7 ft. thick, estimated grade 2½% V_2O_5, 0.15 SOQ; for remaining 14 ft. 0.1 to 0.3 ft. thick, estimated grade is 0.75% V_2O_5, 0.05 SOQ. Upper showing is 36 ft. long, 1 to 1.3 ft. thick, estimated grade is 1/2% V_2O_5.
Office Sample No. 1377: 1.60-0.07-1.61(T);0.13(E).

S-W 41
From Station 18, N.75½°E., 600 ft.
Outcrop is 2 ft. long, 0.3 ft. in thickness.
Not sampled. Estimated grade 1/2% V_2O_5, trace SOQ.

S-W 42
From Station 18, N.75°E., 440 ft.
Outcrop is 6 ft. long, 0.1 to 0.3 ft. in thickness.
Not sampled. Estimated grade is 1/2% V_2O_5, 0.05% SOQ.

S-W 43
From Station 12, S.76½°W., 2840 ft.
Outcrop is 3 ft. long, average thickness 0.3 ft.
Not sampled. Estimated grade is 1/4% V_2O_5, trace SOQ.

S-W 44
From Station 3, N.64½°W., 5300 ft.
Length of outcrop is 2 ft., 0.1 ft. thick.
Estimated grade 1/2% V_2O_5, 0.05% SOQ. Not sampled.

S-W 45
From Station, 18, N.27°E., 1360 ft.

Length of outcrop is 12 ft.; thickness is 0.1 to 0.7 ft.
Office Sample No. 1378: 0.7'-0.21-2.74(T);0.24(E).

S-W 46

From Station 18, N.6½°E., 1360 ft.
Outcrop is 8 ft. long, thickness 0.3 to 1.5 ft.
Office Sample No. 1386: 0.9'-0.18-2.77(T);0.16(E).

S-W 47

From Station 28, N.6°W., ft 1400 ft.
Outcrop consists of two parts. West end is 18 ft. long, 0.3 to 1.75 ft. thick.
Office Sample No. 1382: 1.75'-0.11-1.83(T);0.13(E).
East end is 50 ft. N.73°E. from west end, and is poorly exposed. Length is 18 ft. thickness is 0.3 to 1.9 ft.
Office Sample No. 1388: 1.9'-0.02-1.59(T);0.02(E).

S-W 48

From Staion 28, N.22½°W., 1580 ft.
Outcrop is 3 ft. long, 0.1 ft. thick.
Not sampled. Estimated grade is 1½% V_2O_5, 0.12 SOQ.

S-W 49

From Station 13, N.51°E., 4385 ft.
Showing consists of two parts 31 ft. apart. First part is 10 ft. long, 0.7 to 1.0 ft. thick.
Office Sample No. 1398: 0.95'-0.12-3.29(T);0.21(E).
Second part is 9 ft. long, 0.1 ft.thick. Not sampled.

S-W 50

From Station 28, N.52°W., 2160 ft.
Showing is 5 ft. long, 0.25 ft. thick.
Office Sample No. 1395: 0.25'-0.02-2.04(T);0.04(E).

S-W 51

From Station 16, S.8°E., 5960 ft.
Outcrop is 1 ft. long, poorly exposed, 1 ft. thick.
Office Sample No. 1272: 1.0'-1.53-9.04(T);0.98(E).

S-W 52

From Station 10, S., 1000 ft.
Outcrop, poorly exposed, is 1 ft. long, 0.25 ft. thick.
Not sampled. Estimated grade is 1% V_2O_5, trace of SOQ.

S-W 53

Ftom Station 28, N.3°W., 2450 ft.
Outcrop is 10 ft. long averaging 0.1 ft. in thickness.
Office Sample No. 1389: 0.1'-0.13-0.50(T);0.11(E).
The thin iron seam which this outcrop occurs is traceable for a considerable distance. N.5°W., 150 ft. from this outcrop, another small vanadiferous showing occurs in the iron-bearing seam, about 15 ft. long, 0.1 to 0.25 ft. thick. Trace of SOQ noted.

S-W 54

From Station 28, N.12°E., 1920 ft.
Outcrop is 1 ft. long, 0.1 to 0.2 ft. thick.
Estimated grade is 2½% V_2O_5, 0.1% SOQ.
Not sampled. This showing is a small pocket of vanadiferous sandstone surrounding a small remnant of fossilized vanadiferous wood. S.78°E., 20 ft. from outcrop, in the same stratum, a seam of vanadiferous sandstone, short and poorly exposed, about 0.1 ft. in thickness is found. This is also associated with fossil wood.

S-W 55

From Station 28, N.17°E., 1620 ft.
Outcrop is 3 ft. long, average thickness is 0.3 ft.; seam is poorly exposed. Estimated grade is 2% V_2O_5, a trace of SOQ.
Not sampled.

Assay results above are reported in the following order: Office sample number; thickness, in feet and tenths; Chemical (Tonawanda) % SOQ and % V_2O_5; % SOQ Electroscopic (Grand Junction).

Showing numbers S-B 1, S-B 23, S-B 24, S-B 25, S-B 26. S-B 27, S-B 28, S-B 29, S-E 1, S-E 4 were not used.

It will be noted that the best outcrops of the area have been covered by VCA and Curran and Wade locations.

Of the above outcrops, it will be noted that 59 of them are located on the leased ground of Vanadium Corporation of America or of Curran Bros. & Wade. These are the choicest outcrops of the area.

The remaining 69 outcrops that are on open ground, subject to lease, are relatively unimportant and have a poor prospective value. It is roughly estimated that these remaining outcrops might produce a combined total of 1500 tons of 2% V_2O_5 ore. However, they are so widely scattered and the tonnage available from each outcrop is so small, that the maining cost would probably prove to be prohibitive.

The assay returns on these outcrops have not been available so it is impossible to estimate the V_2O_5 grade. The ore is similar in type and character to the Paradox ore and the SOQ content should approximate 0.28%.

The ore horizon of the area occurs from 15 to 43 ft. above the Entrada-Salt Wash contact.

RECOMMENDATIONS

It is very doubtful that the drilling of these 69 outcrops, on open ground, would develop any appreciable tonnage of commercial ore. These ore outcrops are so poor, thin and discontinuous that I hesitate to recommend any specific drilling program. However, if any drilling equipment should be moved into the Cove Mesa District at a later date, a few test holes might be advisable in this (Beclabito) district.

Syracuse Mine

Special mention shoold be made of this property. The ground is leased from the reservation by Curran Bros. & Wade of Farmington, New Mexico and consists of a 600 x 1500 ft. claim of approximately 20 acres.

The claim covers a small hill. The best ore outcrops are on the south side of the hill but ore also outcrops in at least two places on the north side of the hill. The ore apparently continues irregularly through the hill and follows the bedding plane dip of the Salt Wash. For the plan of the property, as well as the structural details, see the 1" = 40' detail map of the property.

The south side ore outcrops have been mined and are reported to have produced 1500 tons of 3% V_2O_5 ore. The workings all show residual low-grade ore in the walls and headings.

The property is well adapted to drilling. The maximum depth hole required to reache the ore horizon is approximately 100 ft.

I consider this property to have the best prospective value af anything seen on the Navajo Reservation.

LIST OF MAPS TO ACCOMPANY REPORT
on the
B'CLA B'TOH DISTRICT

File No.	Description	Scale
N. Mex.-cu-8	Areal map No. 1	1 in. equals 2000 ft.
N. Mex.-cu-9	Areal map No. 2	1 in. equals 2000 ft.
N. Mex.cu-10	Columns A, B, C, D,	1 in. equals 40 ft.
N. Mex.-cu-11	Columns E, F, F(north)	1 in. equals 40 ft.
N. Mex.-cu-12	Columns H, I, J, K	1 in. equals 40 ft.
N. Mex.-cu-13	Columns L, M, N, O	1 in. equals 40 ft.
N. Mex.-cu-14	Columns P, Q, R, S	1 in. equals 40 ft.

FOLDED INTO REPORT

11 by 15½ in. Plan of Syracuse Mine
showing workings and inferred ore,
scale 1 inch equals 50 feet.
.....Back of Report

B'Cla B'Toh District
Carrizo Uplift Area
Index Map.....Between pages
2 & 3 of Report